

REMARKS

In response to the Office Action mailed April 15, 2009, Applicants respectfully request reconsideration. Claims 1-7 were previously pending in this application. Claim 1 has been amended herein. New claim 8 has been added. As a result, claims 1-8 are pending for examination with claim 1 being the sole independent claim. No new matter has been added.

Summary of Examiner Interview

Applicants' representative appreciates the courtesies extended by Examiner Mitchell in granting two telephone interviews on September 10th and 18th. The substance of the interviews is summarized herein.

Applicants' representative called to seek clarification regarding the Office Action mailed April 15, 2009, because the rejections appear to have been addressed by Applicants' prior amendments and remarks. For example, the Office Action again relies upon the "horizontal thickness" of Chiang's layer in the rejection of claim 1. Applicants had previously amended claim 1 to overcome this rejection, and provided remarks explaining why the amendment distinguished over Chiang. The Examiner stated that he will reconsider the Chiang rejection in view of Applicants' prior amendment.

The Examiner also pointed out another potential ground of rejection. The Examiner stated that a bond pad according to the prior art may have a reduced thickness as a result of the application of a probe or wire bond contact. To further the prosecution of this application, Applicants' representative proposed amending the claims to recite that the thickness of the metal contact pads is smaller than that of the conductive strips prior to application of an external contact. The Examiner stated that such an amendment may be sufficient to distinguish over the art of record.

Claim 1 has been amended herein to recite that the first thickness of the metal contact pads, at least for portions of the metal contact pads that are not covered by the passivation layer, is smaller than the second thickness of said conductive strips prior to application of an external contact to the metal contact pads. Accordingly, the claims are believed to distinguish over the art of record.

Rejections Under 35 U.S.C. 103

I. The Office Action rejected independent claim 1 under 35 U.S.C. 103 as purportedly being unpatentable over Chiang (U.S. Patent No. 4,576,900). Applicants respectfully request reconsideration.

Chiang describes a multi-level interconnect system for an integrated circuit. FIG. 23 of Chiang shows that a wire 595 is bonded to a bonding pad 581, which is shown crosshatched. A second crosshatched region is shown in the same level as bonding pad 581, on the right side of FIG. 23. The second crosshatched region is not labeled with a reference character. As shown in FIG. 23 of Chiang, bonding pad 581 and the unlabeled crosshatched region (right side) both have the same thickness in the vertical dimension of FIG. 23. On page 2, the Office Action states that it is relying on the "horizontal thickness" of bonding pad 581 as purportedly being the thickness recited in Applicants' claim 1.

By contrast, claim 1 recites that the metal contact pads have a first length, a first width, and a first thickness, the first thickness being the distance from a bottom of the metal contact pads to a top of the metal contact pads, wherein the first length and the first width are greater than the first thickness, wherein the metal conductive strips have a second thickness along a same direction as the first thickness, wherein the first thickness of the metal contact pads, at least for portions of the metal contact pads that are not covered by the passivation layer, is smaller than the second thickness of said conductive strips prior to application of an external contact to the metal contact pads.

The Office Action relies upon the horizontal dimension of FIG. 23 of Chiang as purportedly being the thickness direction of Applicants' claim 1. However, under this interpretation, Chiang does not meet the limitation that the length and width of the metal contact pad are greater than the thickness of the contact pad. Rather, as shown in FIG. 23 of Chiang, the vertical dimension of bonding pad 581 is smaller than the horizontal dimension. Therefore, the thickness direction of the contact pad is not along the horizontal dimension of FIG. 23 of Chiang. Using the vertical dimension of Chiang as the thickness dimension, Chiang fails to teach or suggest that a first thickness of the metal contact pads, at least for portions of the metal contact pads that are not covered by the passivation layer, is smaller than the second thickness of said conductive strips. Rather, FIG. 23 of Chiang shows that bonding pad 581 and the unlabeled cross hatch region (right side) both have the same thickness in the vertical dimension of FIG. 23.

For at least these reasons, claim 1 patentably distinguishes over Chiang. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 2-8 depend from claim 1 and patentably distinguish over Chiang for at least the same reasons.

II. The Office Action rejected independent claim 1 under 35 U.S.C. 103(a) as purportedly being unpatentable over Sahara et al. (U.S. Patent Publication No. 2002/0063340). Applicants respectfully request reconsideration.

The Office Action concedes that Sahara et al. does not disclose that the entire thickness of metal contact pads 22 is smaller than conductive strips 23 and 25. However, the Office Action alleges that the claim limitation is purportedly *prima facie* obvious because dimensional limitations are purportedly obvious, absent a showing of unobvious purpose, unexpected result, etc. (citing various CCPA cases). Applicants respectfully disagree.

Sahara's region 22 appears to have the same thickness throughout, which is the same thickness as that of regions 23 and 25 (see FIG. 4c). The presence of a dip in the center of region 22 does not suggest that any portion of region 22 has a smaller or larger thickness than the side portions of region 22.

The Office Action has failed to set forth a *prima facie* case of obviousness. To establish a legally-sufficient *prima facie* case of obviousness, both the MPEP and federal circuit caselaw require factual findings about the scope and content of the prior art, and the articulation of some rationale as to why the invention would have been obvious to one of ordinary skill in the art.

MPEP 2142 states:

The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1396 (2007) noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Federal Circuit has stated that "rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006).

The Office Action has failed to meet its burden of establishing a prima facie case of obviousness. The Office Action concedes that certain limitations are not present in Sahara, yet the Office Action has not provided any rationale as to why it would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Sahara et al. to include the missing limitations. The rejection is therefore improper.

Furthermore, Applicants' specification provides ample evidence as to the significance of the thickness limitations of claim 1. Claim 1 recites, *inter alia*, that "the first thickness of the metal contact pads, at least for portions of the metal contact pads that are not covered by the passivation layer, is smaller than the second thickness of said conductive strips. As described in the specification on pages 1 and 2 and illustrated in FIGS. 2 and 3, welding a metal wire to a contact pad can cause reliability problems because cracks 22 and projections 23 can cause short circuits. The present application further states:

The present inventor has determined the origin of the above-mentioned reliability problems for high-density circuits. They are due to an increase in the thickness-to-width ratio of the contact pads. Indeed, to reduce the surface area taken up by conductive strips, while maintaining a resistivity which is as small as possible, the thickness of the metal layer is increased. Further, the decrease in the contact pad width also contributes to increasing the thickness-to-width ratio, which enhances reliability problems.

A decrease in the metal layer thickness can only be envisaged with difficulty since this would increase the resistivity of the conductive strips. The use of a material more conductive than aluminum, such as copper, would however make welding operations more difficult.

To solve these problems, the present invention provides placing on the last metallization level of an integrated circuit "thick" metal conductive strips and "thin" contact pads. (Page 4)

As should be appreciated from the above-cited portions of the specification, the inventor appreciated that the thickness of the contact pads can cause the above-mentioned reliability problems. Sahara does not teach or suggest the thickness limitation recited in claim 1, and provides no reason that one of ordinary skill in the art would have made such a modification. For at least this reason, claim 1 patentably distinguishes over Sahara et al. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 2-8 depend from claim 1 and patentably distinguish over Sahara et al. for at least the same reasons.

III. The Office Action rejected independent claim 1 under 35 U.S.C. 103(a) as purportedly being unpatentable over Liu et al. (U.S. Pat. No. 6,358,831) in combination with Huang et al. (U.S. Pat. No. 6,815,324). Applicants respectfully request reconsideration.

Liu describes a method for forming a top interconnection level and bonding pads. The background section of Liu describes forming wires 26 and a bonding pad 24 from the same metal layer 25 (Col. 2, lines 8-23). Liu states that chemical-mechanical polishing is used to polish the substrate wafer, and the surface of the metal bonding pads tends to become dished. Liu states that dishing weakens the bonding pad, causing a subsequently attached wire bond to be mechanically weak and excessively resistive (Col. 2, lines 20-26).

Huang states that an aluminum contact pad can acquire a bump or mark due to repetitive contacting of the aluminum contact pad by a tester probe (Col. 10, lines 18-22). Huang describes etching the aluminum contact pad to remove the bump (Col. 10, lines 30-36).

The Office Action alleges that it would have been obvious to etch Liu's bonding pad to be smaller in thickness to remove a probe mark or bump as described by Hwang. Applicants respectfully disagree because Liu teaches away from reducing the thickness of the bonding pad. Liu states that reducing the thickness of the pad makes the pad mechanically weaker, and increases the resistance of the pad (Col. 2, lines 20-26). Because Liu states that reducing the thickness of the bonding pad is undesirable, one of ordinary skill in the art would not have modified Liu's bonding pad to reduce its thickness. For at least this reason, claim 1 is not obvious in view of Liu and Huang.

In addition, claim 1, as amended, distinguishes over the combination. Claim 1 recites that the first thickness of the metal contact pads, at least for portions of the metal contact pads that are not covered by the passivation layer, is smaller than the second thickness of said conductive strips prior to application of an external contact to the metal contact pads. The combination does not teach or suggest that the first thickness of the metal contact pads is smaller than the second thickness of said conductive strips prior to application of an external contact to the metal contact pads. Rather, the Office Action's proposed combination would reduce the thickness of the bond pad after the probe mark has been created.

For at least these reasons, claim 1 patentably distinguishes over Liu and Huang.
Accordingly, withdrawal of this rejection is respectfully requested.

Claims 2-8 depend from claim 1 and patentably distinguish over Liu and Huang for at least the same reasons.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 23/2825 under Docket No. S1022.81126US00 from which the undersigned is authorized to draw.

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Respectfully submitted,

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